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EXAMINER	
BARBEE, MANUEL L	
ART UNIT	**PAPER NUMBER**
2857	

DATE MAILED: 05/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/651,323	BONNE ET AL.	
	Examiner	Art Unit	
	Manuel L. Barbee	2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/11/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

Claim 1 has limitations for "including at least one compensating resistor for ... a temperature coefficient of resistance of said plurality of components" and for "dynamically compensating for ... said temperature dependence of said plurality of components of said plurality of components of said bridge circuit components...." While the temperature coefficient of resistance of the plurality of components may be the same as the temperature dependence of the plurality of components, the claim should amended for consistency and to remove the lack of antecedent basis for "said temperature dependence of said plurality of components."

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Independent claims 1, 14 and 15 each contain limitations for dynamically compensating for a temperature dependence of a plurality of components of the bridge circuit using a compensating resistor. Further

claim 1 has limitations for using a compensating resistor to compensate a temperature coefficient of resistance (TCR) of a plurality of components of a bridge circuit. The specification discusses compensating the TCR of circuit components in paragraphs 47-56. Paragraphs 31-35 discuss using a compensating resistor to compensate for the TCR of a heating element and the temperature dependence of a physical property. However, the specification does not discuss using a compensating resistor for compensation of the TCR or the temperature dependence of a plurality of components of the bridge circuit.

4. Claims 1-20 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. As discussed above, the specification does not discuss using a compensating resistor for compensation of the TCR or the temperature dependence of a plurality of components of the bridge circuit. Since the specification does not discuss these limitations, the specification does not enable one of ordinary skill in the art to use a compensating resistor to compensate for TCR or the temperature dependence of a plurality of components of the bridge circuit.

5. Claim 9 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification does not teach how one of ordinary skill in the art would select a bridge voltage as a voltage of the heater element such that the bridge voltage serves as a sensor output signal, as shown in claim 9. In Figure 2, it appears that the bridge voltage is taken between nodes 218 and 220. In Figure 7, this bridge voltage is amplified and used as to indicate thermal conductivity or viscosity (Fig. 7, op-amp 708). The heater voltage would appear to be between nodes 218 and 222 in Figure 2.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 2, 4, 7, 8, 10, 11, 15, 16 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Davey et al. (US Patent No. 5,161,410).

With regard to a locating a bridge circuit on a physical property sensor substrate where the bridge circuit includes a heating element, a plurality of resistors and at least one compensating resistor, as shown in claims 1 and 15, Davey et al. teach a mass flow sensor circuit on a substrate that a heating element, resistors and a sensor that compensates the heating element (col. 5, lines 6-17; col. 8, lines 16-42; Fig. 1, Fig. 3, resistors 102, 104, heating element 16, sensor 100). With regard to driving an imbalance of the bridge circuit to zero and a supply voltage to a level required to stabilize the heating element at a required temperature above ambient temperature and

where the heating element comprises a thin-film heating material, as shown in claims 1 and 15, Davey et al. teach balancing the bridge circuit by keeping the thin film heating element at a certain temperature above the ambient temperature sensed by a temperature sensor by using a differential amplifier to change the supply voltage of the bridge (col. 8, lines 16-42). With regard to dynamically compensating for a temperature coefficient for a temperature coefficient of resistance of the thin-film heating material and temperature dependence of the physical property sensor, as shown in claims 1 and 15, Davey et al. teach balancing the heating element bridge circuit to compensate for changes in the ambient temperature (col. 8, line 16 - col. 9, line 20). The sensor changes value whenever there is a change in the ambient temperature, which changes the voltage supplied to the bridge and changes the value of the heating element compensating the heating element for the change in temperature. Since the sensors value depends upon maintaining the differential with ambient temperature the temperature dependence of the physical property is also compensated. With regard to compensating for a temperature dependence of a plurality of elements of the bridge circuit, as shown in claims 1 and 15, Davey et al. teach a bridge circuit that uses reference resistors along with other components to control the temperature in an enclosure thus compensating for the temperature dependence of components in the enclosure (col. 9, lines 21-59; Fig. 4).

With regard to a Wheatstone Bridge circuit, as shown in claims 2 and 16, Davey et al. teach a Wheatstone Bridge (col. 8, lines 18-21; Fig. 3). With regard to increasing a resistance value of at least one compensating resistor to compensate for temperature

dependence of a physical property value, as shown in claims 4 and 18, Davey et al. teach a temperature sensor that balances the heating element (col. 8, lines 16-42). With regard to minimizing the change in bridge voltage, as shown in claim 7, Davey et al. teach choosing resistors to stabilize and balance the bridge voltage (col. 8, lines 16-42). With regard to selecting the bridge voltage as a supply voltage generated by an amplification of the bridge circuit imbalance, as shown in claim 8, Davey et al. teach amplifying the bridge voltage for the sensor output voltage (col. 8, line 43 - col. 9, line 8, Fig. 3, amplifier 110).

With regard to a front end analog circuit, as shown in claims 10 and 16, Davey et al. teach an analog sensor circuit (Fig. 3, col. 8, lines 32-42). With regard to a gas property sensor, as shown in claim 11, Davey et al. teach a gas property sensor (col. 4, lines 34-49).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 3 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davey et al. in view of Lee et al. (US Patent No. 6,346,703).

Davey et al. teach all the limitations of claim 1 upon which claim 3 depends and claim 15 upon which claim 17 depends. Davey et al. do not teach one other compensating resistor, as shown in claims 3 and 17. Lee et al. teach a three

compensating resistors in a bridge circuit (col. 2, line 57 - col. 3, line 9). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the flow sensor, as taught by Davey et al., to include three compensating resistors, as taught by Lee et al., because then resistance error would have been further reduced (Lee et al., col. 2, lines 21 - col. 3, line 9).

10. Claims 5, 12, 14 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davey et al. in view of Bonne et al. (US Patent No. 6,234,016).

Davey et al. teach all the limitations of claim 1 upon which claims 5 and 12 depend and claim 15 upon which claim 19 depends. Davey et al. do not teach the physical properties, as shown in claims 5 and 19, or a liquid property sensor, as shown in claim 12. Bonne et al. teach measuring specific heat and measuring fluid properties (col. 6, lines 16-18). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the flow sensor, as taught by Davey et al., to include measuring specific heat and fluid properties, as taught by Bonne et al., because then the sensor would have been functional for other measurements.

Claim 14 contains limitations similar to those in claims 1, 4, 5, 7 and 8 and is rejected on the same grounds.

11. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davey et al. in view of Bonne (US Patent No. 5,237,523).

Davey et al. teach all the limitations of claim 1 upon which claim 13 depends. Davey et al. do not teach a solid property sensor, as shown in claim 13. Bonne et al. teach a solid property sensor (col. 5, lines 24-35). It would have been obvious to one of

ordinary skill in the art at the time the invention was made to modify the flow sensor, as taught by Davey et al., to include a solid property sensor, as taught by Bonne et al., because then the sensor would have been functional for other measurements.

Response to Arguments

12. Applicant's arguments filed 28 February 2005 have been fully considered but they are not persuasive. With regard to claims 1, 14 and 15, Applicant states that Davey do not provide for dynamic compensation of all three factors claimed by applicant's invention. Davey et al. teach balancing the heating element bridge circuit to compensate for changes in the ambient temperature (col. 8, line 16 - col. 9, line 20). The sensor changes value whenever there is a change in the ambient temperature, which changes the voltage supplied to the bridge and causes the heating element to change temperature compensating the heating element for the change in temperature. Since the sensors value depends upon maintaining the differential with ambient temperature the temperature dependence of the physical property is also compensated. With regard to compensating for a temperature dependence of a plurality of elements of the bridge circuit, as shown in claims 1 and 15, Davey et al. teach another bridge circuit that uses reference resistors along with other components to control the temperature in an enclosure thus compensating for the temperature dependence of components in the enclosure (col. 9, lines 21-59; Fig. 4). The sensor 16 in Figure 3 acts as a compensating resistor for the thin film heating element and the physical property. In Figure 4, resistors 116 and 118 of the temperature stabilization bridge are compensation resistors for bridge components in an enclosure.

Applicant states that Davey et al. do not mention or disclose an imbalance of the bridge circuit or a zero value or a voltage level for stabilizing the heating element. Davey et al. teach balancing the bridge circuit by keeping the thin film heating element at a certain temperature above the ambient temperature sensed by a temperature sensor by using a differential amplifier to change the supply voltage of the bridge (col. 8, lines 16-42). If the bridge circuit is balanced there would be no imbalance and the imbalance would be zero. Davey et al. teach that whenever the bridge circuit is not balance or has an imbalance that is not zero, an amplifier uses the imbalance to change the supply voltage up or down to stabilize the heating element and bring the imbalance back to zero (col. 8, lines 16-42). The predetermined temperature differential with the ambient temperature is the same as the required temperature rise above an ambient temperature.

With regard to claims 4 and 18, Applicant states that Davey et al. only teach a temperature sensor that balance a heating element and makes no mention or r teaching increasing the resistance value of one or more of the compensating resistors. The sensor 16 in Figure 3 acts as a compensating resistor for the thin film heating element and the physical property. Both the heating element and the sensor act along with the reference resistors 104 and 102 as resistive elements in a Wheatstone Bridge as shown in Figure 3. The resistive value of the sensor increases or decreases depending on the temperature and causes the temperature of heating element 100 to increase or decrease as necessary to keep the bridge balanced.

With regard to claim 7, Applicant state that Davey et al. do not mention or teach minimizing a change in the bridge voltage as the ambient temperature is varied over a required range by an optimal choice of a value of the compensating resistor. As discussed above, the sensing element 16 in Figure 3 acts as a compensating resistor for the thin film heating element and the physical property. As the ambient temperature changes, so does the resistive value of the sensor. When the value of the sensor changes, any imbalance in the bridge circuit is immediately minimized because the amplifier 108 immediately uses the imbalance to change the voltage supplied to the bridge and therefore change the temperature of the heating element 100 until the bridge is balanced.

With regard to claim 8, Applicant states that Davey et al. do not selecting a bridge voltage as a supply voltage generated by an amplification of a bridge circuit imbalance, such that the bridge voltage serves as a sensor output signal of the physical property sensor. In the previous action, amplifier 108 of Fig. 3 was used to meet this limitation. In the present action, amplifier 110 of Figure 3 is used to meet the limitations of claim 8. Davey et al. teach amplifying the bridge voltage for the sensor output voltage (col. 8, line 43 - col. 9, line 8, Fig. 3, amplifier 110). Amplifier 110 of the temperature sensing bridge in Figure 3 amplifies the bridge voltage of the temperature sensing bridge and its output is used to determine the mass flow rate of the measured gas.

With regard to claims 10 and 16, Applicant states that Davey et al. do not mention, suggest or disclose front-end analog circuit or the fact that such a front-end

analog circuit can be configured as a Wheatstone Bridge circuit. Davey et al. teach an analog sensor circuit (Fig. 3, col. 8, lines 32-42). With regard to a Wheatstone Bridge circuit, as shown in claims 16, Davey et al. teach a Wheatstone Bridge (col. 8, lines 18-21; Fig. 3). The circuit includes two Wheatstone Bridge circuits, both shown using analog components. The heater Wheatstone Bridge can be considered a front-end to the sensor Wheatstone Bridge.

With regard to claims 3 and 17, Applicant states that the Examiner has not provided evidence of a reasonable expectation of success or motivation to design a device including all the features taught by Applicant's claims 3 and 17. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the flow sensor, as taught by Davey et al., to include three compensating resistors, as taught by Lee et al., because then resistance error would have been further reduced (Lee et al., col. 2, lines 21 - col. 3, line 9). Applicant may present evidence showing that there was no reasonable expectation of success (MPEP § 2143.02).

With regard to claims 5, 12, 14 and 19, Applicant states that Bonne et al. '016 does not teach one or more of the physical property values shown in claim 5. Bonne et al. '016 teach measuring specific heat and measuring fluid properties (col. 6, lines 16-18). Specific heat is one of the physical properties in claim 5 and therefore the claim limitations are met. Further Applicant states that the Examiner has not provided evidence of a reasonable expectation of success or motivation. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the flow sensor, as taught by Davey et al., to include measuring specific heat and fluid

properties, as taught by Bonne et al., because then the sensor would have been functional for other measurements. Applicant may present evidence showing that there was no reasonable expectation of success (MPEP § 2143.02).

With regard to claim 13, Applicant states that Bonne '523 does not teach a solid property sensor. Bonne et al. teach a solid property sensor (col. 5, lines 24-35). Although the reference teaches considering solid properties of the sensor, it meets the claim language since solid properties are measured. Further Applicant states that the Examiner has not provided evidence of a reasonable expectation of success or motivation. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the flow sensor, as taught by Davey et al., to include a solid property sensor, as taught by Bonne et al., because then the sensor would have been functional for other measurements. Applicant may present evidence showing that there was no reasonable expectation of success (MPEP § 2143.02).

13. Applicant's arguments, see pages 18, 19 and 21, filed 28 February 2005, with respect to the rejection(s)of claim(s) 6, 9 and 20 under 35 USC 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of 35 USC 112, first paragraph.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manuel L. Barbee whose telephone number is 571-272-2212. The examiner can normally be reached on Monday-Friday from 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on 571-272-2216. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

mlb
April 28, 2005

PATRICK ASSOUAD
PRIMARY EXAMINER